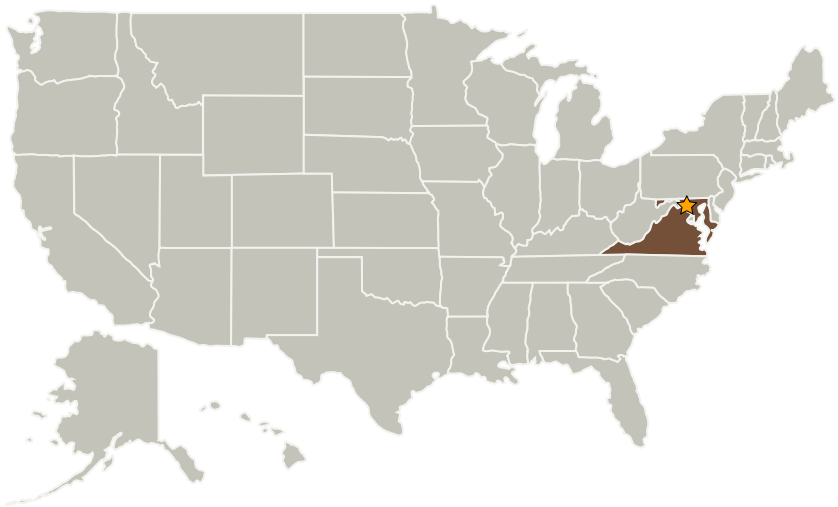
Development of a Tethered Formation Flight Testbed for ISS, Phase I

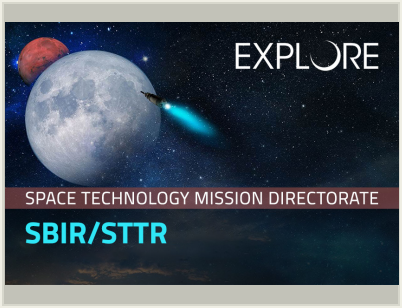
Completed Technology Project (2004 - 2004)

Project Introduction

The development of a testbed for the development and demonstration of technologies needed by tethered formation flying satellites is proposed. Such a testbed would support dynamic modeling and control algorithm development for missions such as NASA?s Submillimeter Probe of the Evolution of Cosmic Structure (SPECS) mission. The testbed would be based on the successful Synchronized Position Hold Engage Re-orient Experimental Satellites (SPHERES) system that has been developed and is being flown on-board the International Space Station. As part of its first flight, SPHERES will demonstrate metrology, formation flight, and autonomy algorithms. The effort proposed here would adapt the SPHERES system first for ground testing and subsequently for a follow-on mission to the ISS to serve as a testbed for Tethered Spacecraft Interferometer (TSI) autonomous software technologies. Tethers are being considered as the means for maneuvering sub-apertures spacecraft in order to eliminate reliance on propellant consumables. The SPHERES-Tether testbed would aid in streamlining the development of spacecraft formation initialization and deployment and retraction algorithm development, and significantly reduce the risk involved with testing this critical SPECS mission operation, including coarse spacecraft formation initialization, deployment and retraction, and multi-stage precision pointing control.

Primary U.S. Work Locations and Key Partners





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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland
Aurora Flight Sciences Corporation	Supporting Organization	Industry	Cambridge, Massachusetts

Primary U.S. Work Locations	
Maryland	Virginia

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Steven W Sell

Technology Areas

Primary:

- TX17 Guidance, Navigation, and Control (GN&C)
  - TX17.3 Control Technologies
    - TX17.3.1 Onboard Maneuvering / Pointing / Stabilization / Flight Control Algorithms